

REMARKS

The Office Action mailed January 23, 2006 has been carefully reviewed. It is respectfully submitted that the present invention, as originally claimed, is patentably distinguishable from the cited references. The above amendments are intended to emphasize the primary distinction between the invention and the cited references.

The Rejection of Claims 1-4 under § 102(b) as Being Anticipated by Lifshits

In the Office Action, the Examiner first rejected claims 1-4 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,062,848 to Lifshits ("Lifshits"). It is submitted that this rejection is improper.

Lifshits fails to disclose all the limitations of claim 1. For example, Lifshits discloses a burner 10 in which secondary fuel gas ports are integrated into a burner plate 12 which is mounted into the furnace. (See FIGS. 1-2 and Col. 2, lines 62-64.) The secondary fuel gas ports in Lifshits are "located around the periphery of the air ports array." (See Col. 3, lines 17-21.) "The pattern of secondary fuel injection in general is such that the secondary fuel jets penetrate in between the jets of air and primary fuel, or products of its combustion." (See Col. 4, lines 16-19.) Consequently, the secondary fuel gas ports in Lifshits are neither "separate" nor "remote" from the burner as originally called for by independent claim 1.

The primary purpose of the Lifshits burner is flame stability rather than reduced NO_x emissions. In Lifshits, the burner plate necessarily includes additional small ports (located in between the air ports) through which anchor gas is injected into the furnace. (See Col. 3, lines 10-14). Although providing greater flame stability, the addition of anchor gas would actually raise the level of NO_x emissions contrary to the underlying purpose of the instant inventions.

As amended, independent claim 1 calls for the secondary fuel gas nozzles to be located separate and remote from the burner such that the secondary fuel gas is not encapsulated or surrounded by the fuel gas-air mixture from the burner thereby allowing secondary fuel gas to mix with flue gases in the furnace prior to mixing with the fuel gas-air mixture. This element clearly distinguishes independent claim 1 from Lifshits.

Unlike the inventive furnace as now called for by independent claim 1, the secondary fuel gas injection tubes of Lifshits are not separate and remote from the primary fuel gas spuds such that the secondary fuel gas is not encapsulated or surrounded by the fuel gas-air mixture from the burner thereby allowing secondary fuel gas to mix with flue gases in the furnace prior to mixing with the fuel gas-air mixture. Rather, the Lifshits burner functions more like the traditional burner discussed and shown by FIG. 1 of the present application.

Thus, Lifshits does not anticipate independent claim 1. The Examiner's rejection of claim 1 on this basis should be withdrawn.

Likewise, dependent claims 2-4 are not anticipated by Lifshits because they depend from a patentable claim. Thus, the rejection of claims 2-4 should also be withdrawn.

The Rejection of Claims 13-14 under § 102(b) as Anticipated by Knight

The Examiner next rejected claims 13 and 14 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,718,573 to Knight et al. ("Knight"). It is submitted that this rejection is also improper.

The method called for by independent claim 13 is entirely different from the method disclosed by Knight. For example, independent claim 13 calls for the step of causing the fuel gas-air mixture to be discharged from the burner whereby the mixture is burned at a relatively low temperature in a combustion zone and flue gases having a low NO_x content are formed therefrom. Knight does not disclose this step. Instead of burning the primary gas-air mixture, the burner in Knight utilizes aerodynamic mixing techniques to create a non-combustible primary gas-air mixture. (Col. 1, lines 48-53; Col. 2, lines 33-37.) Further, Knight fails to teach the limitations recited in step (c) of independent claim 13. As amended, independent claim 13 calls for the step of providing secondary fuel gas to a secondary fuel gas nozzle whereby the secondary fuel gas is discharged from the secondary fuel gas nozzle, mixes with flue gases in the furnace and combusts with excess air from the burner, lowers the temperature of the burning fuel gas and reduces the formation of NO_x. As claimed, the secondary fuel gas nozzle is located separate and remote from the burner such that the secondary fuel gas is not encapsulated or

surrounded by the mixture of fuel gas and air from the burner thereby allowing secondary fuel gas to mix with flue gases in the furnace prior to mixing with the mixture of fuel gas and air from the burner.

According to Knight, the secondary fuel gas does not mix with flue gases in the furnace and does not combust with excess air from the burners. Instead, the secondary fuel gas is added to the non-combustible primary fuel gas-air mixture inside a burner to form a combustible fuel-air mixture which “slows to a velocity that will support combustion.” (See Col. 1, lines 53-57; Col. 2, lines 60-65.) The exhaust gases are removed from the combustion chamber by an induced draft fan through a flue. (See Col. 4, lines 9-10.)

Moreover, “lowering the temperature of the burning fuel gas and reducing the formation of the NO_x” in step (c) is not inherent in the disclosed flashback flame resistance purportedly achieved in Knight. The problem with flame flashback occurs internally with a single burner. Knight proposes reducing the incidence of flashback by employing aerodynamic techniques to create a non-combustible primary fuel gas mixture. The non-combustible mixture in Knight is then accelerated to a velocity higher than the flame speed of a combustible mixture of the primary fuel and air. “The high flame speed flow creates an aerodynamic barrier to flame propagation that prevents flashback.” (Col. 2, lines 31-59.) The reduction of flashback inside the burner by increasing the velocity of the non-combustible primary fuel gas-air mixture is completely unrelated to the reduction of temperatures of burning secondary fuel gas outside the burner.

Thus, Knight fails to teach all the limitations and therefore does not anticipate independent claim 13. The Examiner’s rejection of independent claim 13 should also be withdrawn.

Claim 14 depends directly from independent claim 13 and includes all the limitations thereof. Accordingly, Knight also fails to teach all the limitations of and therefore does not anticipate claim 14. The Examiner’s rejection of claim 14 should also be withdrawn.

The Rejection of the Remaining Claims Under § 103

The Examiner rejected dependent claims 5-9 and 10-12 under 35 U.S.C. § 103(a) as being unpatentable over Lifshits in view of U.S. Patent No. 5,688,115 to Johnson (“Johnson”).

The Examiner stated:

Lifshits is considered to disclose the claimed invention, as discussed above under the anticipatory rejection, except for the claimed furnace floor burners. Johnson, another burner configuration, is considered to disclose furnace floor burners at column 3, line 66 through column 4 line 9. It would have been obvious to one skilled in the art to combine the teachings of Lifshits with the furnace floor burners, considered disclosed in Johnson for the purpose of controlling the fuel trajectory in order to allow lower temperature and NO_x reduction. Furthermore Lifshits is considered to disclose the claimed invention except for the claimed radiant, cylindrical, or cabin furnace. It would have been an obvious matter of design choice to provide a radiant, cylindrical, or cabin furnace since the type of furnace is irrelevant such the claimed invention may be performed by the prior art of record regardless of the type of furnace claimed.

It is respectfully submitted that this rejection is improper.

As discussed above, independent claim 1 includes limitations that are not disclosed by Lifshits. As a result, contrary to the assertion of the Examiner, Lifshits does not disclose the claimed invention with respect to any type of furnace. Furthermore, even if Lifshits disclosed the claimed invention except for the claimed furnace floor burners, there is nothing in the prior art that would have motivated one skilled in the art to combine the teachings of Lifshits and Johnson. The Examiner has not provided sufficient reasons to demonstrate that the skilled artisan, confronted with the same problems as the inventor with no knowledge of the claimed invention, would select the elements from Lifshits and Johnson for combination in the manner claimed. Accordingly, a prima facie case of obviousness has not been established with respect to dependent claims 5-9 and 10-12.

Next, the Examiner rejected claims 15-19 and 20-22 under 35 U.S.C. § 103(a) as being unpatentable over Knight in view of Johnson. The Examiner stated:

Knight is considered to disclose the claimed invention, as discussed above under the anticipatory rejection, except for the claimed furnace floor burners. Johnson, another burner configuration, is considered to disclose furnace floor burners at column 3, line 66 through column 4 line 9. It would have been obvious to one skilled in the art to combine the teachings of Knight with the furnace floor burners, considered disclosed in Johnson for the purpose of controlling the fuel trajectory in order to allow lower temperature and NO_x reduction. Furthermore Knight is considered to disclose the claimed invention except for the claimed radiant, cylindrical, or cabin furnace. It would have been an obvious matter of design choice to provide a radiant, cylindrical, or cabin furnace since the type of furnace is irrelevant such the claimed invention may be performed by the prior art of record regardless of the type of furnace claimed.

Again, contrary to the assertion of the Examiner, Knight does not disclose the claimed invention, regardless of the type of furnace involved. Further, even if Knight disclosed all the elements called for by claims 15-19 and 20-22, except for the claimed furnace floor burners, claims 15-19 and 20-22 would not have been obvious to one skilled in the art. There is nothing that would have motivated the skilled artisan to make the combination asserted by the Examiner. Accordingly, a prima facie case of obviousness has also not been established with respect to claims 15-19 and 20-22.

Thus, the rejections of the claims under 35 U.S.C. § 103 should also be withdrawn.

The Double Patenting Rejection

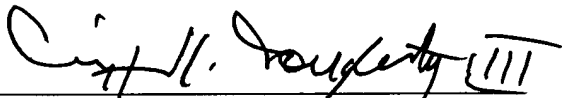
The Examiner provisionally rejected claims 1-22 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-28 of co-pending application no. 10/758,642.

Co-pending application Serial No. 10/758,642 issued as U.S. Patent No. 7,025,590 B2 on April 11, 2006. Thus, it appears that the provisional status of the obviousness-type double patenting rejection will be removed. In order to overcome an actual double patenting rejection, a terminal disclaimer in compliance with 37 C.F.R. § 1.321(c) is submitted herewith. In view of the terminal disclaimer, Applicants request that the Examiner withdraw the provisional obviousness-type double patenting rejection.

Conclusion

For the foregoing reasons, the Examiner is respectfully requested to allow claims 1-22 at this time. This is intended to be a complete response to the Office Action.

I hereby certify that this correspondence is being deposited in the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.


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Respectfully submitted,



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